

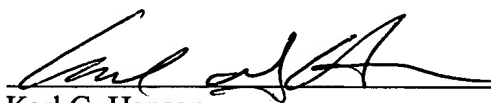
REMARKS

Claims 1-32 have been canceled, and claims 33-64 have been added to this application, Thus, claims 33-64 are now pending in this case.

The specification also has been amended to make a number of corrections to the text and to provide an identifying number for the "seal surface" 31 in the drawings.

Dated this 18th day of April, 2001.

Respectfully submitted,



Karl G. Hanson
Attorney for Applicants
Registration No. 32,900

Office of Intellectual Property Counsel
3M Innovative Properties Company
3M Center, P.O. Box 33427
St. Paul, Minnesota 55133-3427
Telephone: (651) 736-7776
Facsimile: (651) 736-3833
48317USA3M.032\PTO\Preliminary Amendment

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Changes to Specification

Page 3:

wherein, the fluid-permeable face mask can demonstrate a negative pressure drop when air is passed into the filtering face mask with a velocity of at least [0.8] 8 m/s under a normal exhalation test.

0983714-041801

[illegible]

13

Page 10:

Valve seat 26 preferably is made from a relatively light-weight plastic that is molded into an integral one-piece body. The valve seat can be made by injection molding techniques. The surface 31 of the seal ridge 30 that makes contact with the flexible flap 24 (the contact or seal surface) is preferably fashioned to be substantially uniformly smooth to ensure that a good seal occurs. The contact surface preferably has a width great enough to form a seal with the flexible flap 24 but is not so wide as to allow adhesive forces caused by condensed moisture to significantly make the flexible flap 24 more difficult to open. The width of the contact surface, preferably, is at least 0.2 mm, and preferably is in the range of about 0.25 mm to 0.5 mm.

096374 "041801

Page 14:

Exhalation valve 14 can be provided with a valve cover to protect the flexible flap 24, and to help prevent the passage of contaminants through the exhalation valve. In FIG. [6] 7, a valve cover 50 is shown which can be secured to exhalation valve 14 by a friction fit to wall 44. Valve cover 50 also can be secured to the exhalation valve 14 by ultrasonic welding, an adhesive, or other suitable means. Valve cover 50 has an opening 52 for the passage of a fluid. Opening 52 preferably is at least the size of orifice 32, and preferably is larger than orifice 32. The opening 52 is placed, preferably, on the valve cover 50 directly in the path of fluid flow 36 so that eddy currents are minimized. In this regard, opening 52 is approximately parallel to the path traced by the free end 38 of flexible flap 24 during its opening and closing. As with the flexible flap 24, the valve cover opening 52 preferably directs fluid flow downwards so as to prevent the fogging of a wearer's eyewear. All of the exhaled air can be directed downwards by providing the valve cover with fluid-impermeable side walls 54. Opening 52 can have cross-members 56 to provide structural support and aesthetics to valve cover 50. A set of ribs 58 can be provided on valve cover 50 for further structural support and aesthetics. Valve cover 50 can have its interior fashioned such that there are female members (not shown) that mate with pins 41 of valve seat 14. Valve cover 50 also can have a surface (not shown) that holds flexible flap 24 against flap-retaining surface 40. Valve cover 50 preferably has fluid impermeable ceiling 60 that increases in height in the direction of the flexible flap from the fixed end to the free end. The interior of the ceiling 60 can be provided with a ribbed or coarse pattern or a release surface to prevent the free end of the flexible flap from adhering to the ceiling 60 when moisture is present on the ceiling or the flexible flap. The valve cover design 50 is fully shown in U.S. Design Patent Application 29/000,382. Another valve cover that also may be suitable for use on a face mask of this invention is shown in Design Patent Application 29/000,384. The disclosures of these applications are incorporated here by reference.

Page 20:

The exhalation valve of Example 1 was mounted to a 3M 8810 filtering face mask such that the exhalation valve was positioned on the mask body directly opposite to where a wearer's mouth would be when the mask is worn. The airflow through the nozzle was increased to approximately 80 l/min to provide an airflow velocity of [0.9] 8.3 meters per second (m/s). At this velocity, zero pressure drop was achieved inside the face mask. An ordinary person will exhale at moderate to heavy work rates at an approximate air velocity of about [0.5 to 1.3] 5 to 13 m/s depending on the opening area of the mouth. Negative and relatively low pressures can be provided in a face mask of this invention over a large portion of this range of air velocity.

09837714 0443001

Changes to the Abstract

[An exhalation valve 14 for a filtering face mask 10 has a flexible flap 24 that makes contact with a curved seal ridge 30 of a valve seat 26 when the valve 14 is in the closed position. The curvature of the seal ridge 30 corresponds to a deformation curve exhibited by the flexible flap 24 when secured as a cantilever at one end and exposed at its free portion to a uniform force and/or a force of at least the weight of the free portion of the flexible flap. A seal ridge curvature corresponding to a flexible flap exposed to uniform force allows the flexible flap 24 to exert a generally uniform pressure on the seal ridge to provide a good seal. A seal ridge curvature corresponding to a flexible flap exposed to a force of at least the weight of the flap's free portion allows the flexible flap 24 to be held in an abutting relationship to the seal ridge 30 under any static orientation by a minimum amount of force, thereby providing a face mask 10 with an extraordinary low pressure drop during an exhalation.]

A filtering face mask that comprises a mask body adapted to fit over the nose and mouth of a person; and an exhalation valve that is attached to the mask body. The exhalation valve comprises a valve seat and a flexible flap. The valve seat has an orifice through which fluid can pass and is surrounded by the seal surface. The flexible flap is operatively supported relative to the valve seat and pressed against the seal surface of the valve seat in a closed state of the exhalation valve. The flexible flap assumes in its closed state, a curved profile in a cross-sectional view thereof. The curved profile comprises a curve that extends from a first point where a first portion of the flexible flap contacts the seal surface to a second point where a second portion of the flexible flap contacts the seal surface. The flexible flap is held in its closed state, at least in part, by virtue of the curved profile thereof. The second portion of the flexible flap represents the only free portion of the flap and can flex so as to permit exhaled air to pass through the orifice and to provide an open state of the fluid flow valve such that the second portion of the flexible flap is out of contact with the seal surface at the second point while the first portion of the flexible flap is maintained in contact with the seal surface at the first point.